PATENT CLAIMS

sub B'

1. Spray-pyrolysis or spray-drying plant, characterized in that, in a plant which is constructed vertically or horizontally,
a) a reaction tube (1) is accommodated in an outer tube (2) of heat-resistant steel sheeting in such a way that an annular space is formed between the two tubes, where
b) an atomization system (3) is located at one end of the tubes and the gas outlet (4) is located at the opposite end, whereas
c) one or more jacket connectors (5) lead into the annular space, optionally at the height of the atomization system or distributed over the length of the plant, and
d) if desired, gas inlet slots or nozzles (6) and (7), under certain circumstances also in the form of a gas burner, at the height of the atomization system lead into the reaction tube.

2. Spray-pyrolysis or spray-drying plant according to Claim 1, characterized in that the reaction tube consists of a heat-resistant, porous material.

sub a'

3. Spray-pyrolysis or spray-drying plant according to Claims 1 and 2, characterized in that the reaction tube consists of a porous material which is heat-resistant up to 1200°C and which has a pore diameter of from 1 to 5 μm.

4. Spray-pyrolysis or spray-drying plant according to Claims 1 and 2, characterized in that heat-resistant, porous material consists of heat-resistant metal alloys or suitable ceramic materials.

Sub a1

5. Spray-pyrolysis or spray-drying plant according to Claims 1 and 2, characterized in that the reaction tube consists of heat-resistant sintered metal, metal mesh or metal non-woven media.

Sub B1

6. Spray-pyrolysis or spray-drying plant according to Claim 1, characterized in that the atomization system consists of a nozzle plate to which the atomization energy is transferred by means of a piezoceramic oscillator.

7. Spray-pyrolysis or spray-drying plant according to Claim 6, characterized in that the nozzle plate has holes having a diameter of from 10 to 40 μm.

8. Reaction tube consisting of a gas-permeable, porous material which is heat-resistant up to 1200°C and has a pore diameter of from 1 to 5 μm.

9. Spray-pyrolysis or spray-drying process, characterized in that gas is passed through a jacket connector (5) into an annular space formed by a reaction tube (1) and an outer tube (2), the introduced gas flows through the porous material of the reaction tube into the reaction space, resulting in the formation of a gas stream away from the jacket surface, which prevents deposition of formed particles on the surface.

10. Spray-pyrolysis or spray-drying process, characterized in that a solution or suspension of a metal salt or a mixture of metal salts or a metal salt solution which comprises suspended, insoluble particles of a metal-containing compound, for example metal oxides, is introduced in the desired stoichiometric ratio by means of an atomization system (3), consisting of a nozzle plate, to which the atomization energy is

transferred by means of a piezoceramic oscillator, in finely divided form in the form of a monodisperse spray into the reaction tube (1), where it encounters the pre-heated gas flowing in through the porous wall of the reaction tube and is either dried in the gas stream to form a powder having a uniform particle size distribution and is discharged at the end of the reaction tube together with the gas stream, or
is caused to decompose or react in the gas stream by supply of additional process energy, where the reaction may be exothermic, and the particulate product formed is discharged at the end of the reaction tube together with the gas stream.

Sub a2 11. Process according to Claims 9 and 10, characterized in that the wall of the reaction tube is cooled constantly during the exothermic reaction by the gas passing through from the outside.

12. Process according to Claim 10, characterized in that, instead of the atomization system described, one or more single- or multi-component nozzles serve as atomizer.

Sub a3 13. Process according to Claims 9 to 12, characterized in that additional process energy is supplied by burning a gas with an oxidant, where either
the air is supplied from the outside via the jacket connector (5) and the gas is added from the inside via gas connectors and inlet slots (6) and (7), or
the gas is added from the outside (5) and the air is added from the inside via gas connectors and inlet slots (6) and (7), or
the air supplied via the jacket connector (5) is electrically heated, flows through the porous wall

and reacts exothermically with the stream of fuel gas added via the gas connector and inlet slots (6) and (7) and increases the reaction temperature.

14. Process according to Claims 9 to 13, characterized in that powder materials having an average particle size of from 0.1 to 10 μm are obtained.

15. Process according to Claims 9 to 14, characterized in that the powder materials obtained do not comprise hard agglomerates.

16. Process according to Claims 9 to 14, characterized in that the molecular weight fraction of any desired component of the powder material obtained differs by a maximum of 1.5% compared with the corresponding molecular weight fraction in the precursor solution, based on the corresponding molecular weight fraction in the precursor solution.